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## REMARKS

Claims 1, 3-5, 7-22, and 24-27 are currently pending. Claim 5 has been amended to incorporate the subject matter of base claim 1 and intervening claim 4. Claims 19 has been amended to incorporate the subject matter of base claim 1 and intervening claims 13, 15, and 17. Claim 1, 12, 15, 17, 20, 21, 24, and 27 have been amended for clarification purposes only. It is respectfully submitted that no new matter has been added.

The Patent Office has rejected claims **1, 3-5, 7, 8, 13-22, and 27** as obvious in view of combination of US 2002/0062547 (Chiodo et al), US 6,876,543 (Mockridge et al), and U.S. Published Patent Application No. 2004/0074069 (Browne).

Chiodo discloses a method for disassembling elements where an article is disassembled by triggering shaped transition of shape memory material within the article (abstract). In one form, a de-fastener (16) which looks like a spring is triggered to expand to break apart first and second parts (10a, 10b) which may be integrally formed, or fastened together (abstract). In another form, shape memory polymer is used as a releasable fastener, the shape memory polymer losing integrity above a predetermined temperature (abstract). Chiodo appears to be directed to solving problems concerning the recycling industry to comply with environmental legislation (paragraph 0002).

Chiodo discloses, in paragraph 0026, as follows:

The shape memory material may be activated by any suitable means, preferably a means for subjecting the material to a temperature change above, or below, a transition temperature. For example, for elevated temperatures, heat may be supplied using hot gas (e.g. air), steam, or electrical current. **The activation means may, for example, be in the form of a heated room or enclosure, or an iron for supplying heat, a hot air blower or jet, means for passing an electric current through, or inducing an electrical current in (e.g. by magnetic or microwave interaction), the shape memory material (or through or in an element in thermal contact therewith).**

Although Chiodo discloses activation means that may involve passing an electric current through or inducing an electrical current in, Chiodo seems to be directed to using such means only as a way to heat the fastener to trigger a release state as evidenced in paragraphs 0086-0090, 0096-0098, 0105-0109, and 0115. For example, in paragraph 0086, Chiodo discloses "the

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invention may also be used to mount electronic components, such as integrated circuits, in a self-releasing manner" where "a plurality of contacts 54 of electrically conductive memory shape alloy each in the shape of a small helical coil." In paragraph 0088, Chiodo further discloses the "shape memory material is also trained at an elevated temperature (or at a lowered temperature, as desired) to expand in diameter, and "unwind" sufficiently to release the legs 58 and/or allow leg insertion." As another example, Chiodo discloses, in paragraph 0096, a socket that "includes a plurality of cantilever contacts 70 which extend laterally from a support 72 of electrically insulating material" and, in paragraph 0097, a further electrical conductor strip over the tops of contacts 70 to "generate heat when an electrical current is passed therethrough, to cause shape transition of the contacts 70." As yet another example, Chiodo's embodiment in Figure 15 is disclosed in paragraph 0105 as having heater contacts 106 to "provide direct electrical connection to the actuator, to allow an electrical current to be passed therethrough to heat the actuator."

It does not appear that Chiodo relates well to the claimed invention as found in claim 1. Not only does Chiodo not teach an engine assembly or a cover for encasing the engine assembly, Chiodo also does not disclose a "closing arrangement including a polymer actuator which is alterable between a first configuration and a second configuration to alter the closing arrangement between the first and second conditions respectively, wherein the polymer actuator includes an electroactive polymer," "the electroactive polymer being a polymer which is capable of converting electrical to mechanical energy" or applying a voltage "to alter the polymer actuator between its first and second configurations" where "application of voltage is not necessary to maintain it in either its first or its second configuration."

Chiodo discloses various shape memory alloy elements in Figure 21 and various shape memory polymer elements in Figure 22.

Chiodo discloses an embodiment of a case 10 of a slim article, such as a calculator, consisting of an upper or front shell 10a and a lower or rear shell 10b attached by a snap fit connection (paragraph 0065). In this slim article case embodiment, Chiodo discloses that a defastener is trained to change shape between a compressed state at normal room temperature to an expanded shape at above a transition temperature (paragraph 0067). In cases where less force is required or less space is available, Chiodo discloses an embodiment with a rod shaped defastener 24 (paragraph 0074) also heat activated for release (paragraph 0074). Other

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embodiments in Chiodo include a heat releasable fastener for a keyboard and supporting structure (paragraph 0083) and mounting techniques for electronic components, such as integrated circuits, in a self-releasing manner (e.g. paragraph 0086).

Chiodo also discloses an “apparatus for processing one or more products to perform at least partial self-disassembly” in which a chamber through which the products are conveyed is “heated or cooled to a predetermined temperature to trigger release of the shape memory material in the products” (paragraph 0119).

It is clear that Chiodo is directed only to shape memory materials that provide a release state through heating of the shape memory materials.

Mockridge discloses a housing for a communication device and method assembling the same in which the front and rear housings include a cantilever arm and loop assembly to secure the top ends of the front and rear housings to each other (abstract). The contact surface on each hook is outwardly sloped and the contact surface on each latch is inwardly and downwardly sloped (abstract; column 5, lines 28-41). Instead of latches and hooks, an embodiment of Mockridge uses recesses and ribs (e.g., column 3, lines 29-37).

In Mockridge, the housings are connected through purely mechanical means without the use of heat, electricity, or magnetism. Mockridge is directed to simple mechanical assembly of housings to “facilitate assembly of the device” (column 1, lines 9-33).

Mockridge is cited for a teaching of an engine assembly in a device, according to page 3, lines 16-20, of the Office Action dated May 23, 2007.

It is not clear why one of ordinary skill would seek to modify the slim calculator case disclosed by Chiodo to have an engine assembly.

The Patent Office further asserts, on page 4, lines 2-9, of the Office Action dated May 23, 2007, as follows:

The combination of CHIODO and MOCKRIDGE further disclose applying heat transfer to the polymer actuator and further teaches passing an electrical current through the material. However, the combination of CHIODO and MOCKRIDGE does not expressly disclose wherein the polymer actuator includes an electroactive polymer, the electroactive polymer being a polymer which is capable of converting electrical to mechanical energy, wherein the polymer actuator is bistable, such that voltage may be applied to alter the polymer between its first and second

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configuration, but application of voltage is not necessary to maintain it in either its first or its second configuration.

Chiodo's heat releasing defasteners are directed to recycling an article at the end of the article's life (e.g., paragraph 0069). Because the continued function of an article is usually not a consideration, elevated temperature heat releasing techniques may be used.

It appears that Mockridge has been cited by the Patent Office for the sole purpose of adding an engine assembly to the slim article calculator case disclosed by Chiodo. It does not appear that Chiodo has expressed a need or desire to add an engine assembly. It is doubtful that one of ordinary skill would look to Mockridge for a teaching to modify Chiodo. Even were Chiodo modifiable by Mockridge to add an engine assembly to the slim article calculator case of Chiodo, a so modified Chiodo would still connect the front and rear shells 10a, 10b through a lug 12 and rim 14 arrangement (paragraph 0065).

Browne seeks a solution to the problem of disengagement of separable fasteners, such as hoop-and-loop fasteners (paragraph 0003), where "disengagement of the components by peeling one component from the other component can be used to separate the components with a minimal applied force." This identified problem of hoop-and-loop fasteners would presumably not be a problem for a lug and rim arrangement that provides the means for attaching front and rear shells in Chiodo (paragraph 0065).

Browne discloses an electro-activatable releasable fastening system comprising a polymer film that is electro-activatable in response to a voltage applied to the electrodes to effect a controlled engagement of the first surface and the second surface (paragraph 0004). Browne discloses an electrolytically activated polymer film disposed at the interfaces of the surfaces to be attached and varying the film's volume of configuration to control the mechanical engagement (paragraph 0016). Browne discloses ionic polymers (paragraph 0019) and dielectric polymers (paragraph 0028) where dielectric polymers are elastically deformable in response to a biasing force.

**To return to the context of Chiodo, the base reference, why would one of ordinary skill seek to modify the slim article calculator case of Chiodo by replacing the elevated temperature defastener with an electroactive polymer actuator?**

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Furthermore, the Patent Office alleges that since Browne discloses dielectric polymer actuators, Browne therefore inherently discloses bistable polymer actuators.

This is not correct.

**Browne does not disclose or suggest the use of bistable polymer actuators as recited in the currently pending independent claims. This is because when zero voltage is applied to a dielectric polymer actuator, there is charge migration which results in the dielectric polymer changing shape i.e. it is not bistable. In Applicant's invention, the bistable polymer actuator changes between being an ionic polymer and a neutral polymer. In this case, the polymer changes its shape by permanent, but reversible redox reaction and that each state is stable until an opposite reaction is caused by applying a voltage (please see attached figure).**

Since Browne does not disclose or suggest that the dielectric polymer acts as described in the preceding paragraph, it therefore does not disclose or suggest bistable polymer actuators.

Thus, 1, 3-5, 7-22, and 24-27 are allowable over Chiodo in view of Mockridge and Browne.

Claim 5 has been rewritten into independent form by incorporating the subject matter of base claim 1 and intervening claim 4. The Patent Office has rejected claim 5 by asserting that the subject matter in claim 5 may be found in Browne, paragraphs 16 to 19 and 26 to 28. The Patent Office's analysis is incorrect since these passages of Browne merely disclose that the conductive film is sandwiched between two electrodes and is not one of the electrodes as recited in claim 5.

The Patent Office asserts that the subject matter in claim 19 is taught by Browne in Fig.1 and paragraphs 16 to 19. This portion of Browne merely discloses that the polymer film 16 is applied to one surface of the connecting block 12 and posts 20. However, Browne does not disclose that the recess extends substantially around the perimeter portion of the other cover part. The cavities 22 in Fig.1 of Browne are shaped to receive posts 20 which are round in cross-section (see paragraphs 18 and 20). One advantage provided by the subject matter in claim 19 is that it may improve the waterproof seal between the cover parts (please see page 11, lines 21 to 23 of the present application). Since none of the cited prior art documents disclose or suggest such an arrangement, claim 19 is allowable.

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Claim 7 recites the “polymer actuator... retains the cover...” Claim 15 recites “the closing arrangement is arranged to selectively retain together first and second closure portions of the hand-portable device...”

To recap, Chiodo discloses slim article cases in Figures 1, 2a, and 2b, in which a heat releasable defastener 16, 24 is incorporated near or at an end. Chiodo also discloses other embodiments including a heat releasable wrapper 44 in Figure 4, a heat releasable line 38 for a screw 34 in Figures 3a and 3b, a heat expandable loop for gripping an integrated circuit pin 58 in Figures 7a and 7b, a “destructive element 112” (paragraph 0108) located in a case wall 110 typically of plastics material, and the aforementioned fasteners in Figures 21 and 22 where the shape memory polymer elements are illustrated as either a guide 138 or various forms of bolt shapes including screws 130, spacers 134, and rivets 140.

Chiodo’s embodiments in Figures 1, 2a, and 2b, relating to a slim article consisting of a front shell 10a and rear shell 10b, use the heat releasable element only as a defastener and not to retain a cover.

Thus, claims 7 and 15 are allowable for this additional reason.

The Patent Office has rejected claims **9-10 and 24-25** as obvious in view of combination of US 2002/0062547 (Chiodo et al), US 6,876,543 (Mockridge et al), and U.S. Published Patent Application No. 2004/0074069 (Browne), and further in view of Staniszewski (US 2004/0075581). The Patent Office has rejected claims **11 and 26** as obvious in view of combination of US 2002/0062547 (Chiodo et al), US 6,876,543 (Mockridge et al), U.S. Published Patent Application No. 2004/0074069 (Browne), and Staniszewski (US 2004/0075581) and further in view of JP 11039053 (Matsunaga).

Staniszewski (paragraph 0073) does not disclose a polymer actuator as is reproduced immediately below to illustrate its teachings in this passage:

FIG. 1C shows cover 152, which may be secured to protect the underlying elements from wear and tear. Cover 152 may be, for example, a hinged cover or a sliding cover, and may be made of any suitable material, for example, plastic or rubber, which is clear or opaque and may include designs according to the user's preference. The cover may include several windows 154 or slots such that a portion of the buttons 150, or one or more security code entry buttons 156, are accessible even when the cover is closed. The cover may lock when closed in a manner that requires the

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user to type in a security code in order to activate a cover lock release. This code may be known only to the user, and may be changed by the user when desired, thereby provide security to prevent unauthorized users from using the electronic timer device 100.

As discussed above, Chiodo is directed to various heat releasable shape memory materials and is directed to recycling.

Claim 9 recites “the device includes input means for allowing the input of security information to control the selective alteration of the polymer actuator between the first and second configurations.” Claims 10 and 11 depend from claim 9.

Claim 23 recites “the selective application of the voltage is controlled by the input of security information to the hand-portable device.” Claims 24-26 depend from claim 23.

Since Chiodo discloses that the defastening process of slim article cases is accomplished through application of heat (e.g., paragraph 0072) and does not disclose an internal heat source for accomplishing the defastening process, one of ordinary skill in the art, looking from the vantage point of modifying Chiodo’s shape memory materials incorporated in a slim article case, would not seek to use the input of security information on the device to control the shape memory materials.

Thus, claims 9-11 and 23-26 are allowable over Chiodo, Mockridge, Browne, and Staniszewski for this additional reason.

Matsunaga (paragraphs 0012-0015) discloses an infrared reception means in a small-scale electronic equipment in which a lock means releases a lock when a password being input from the outside is matched with a preset value.

The Patent Office is reminded that base reference Chiodo, although directed to a variety of shape memory element implementations, only discloses the use of heat to change the shape memory element to defasten slim article cases, such as calculators. Also, in order to accomplish actuation of the defastener of a slim article case in Chiodo via password entry or other entered input on the device, an internal heat source to provide heat to the defastener would seem to be necessary. Chiodo does not disclose such an internal heat source.

Thus, claims 11 and 26 are allowable over Chiodo, Mockridge, Browne, Staniszewski, and Matsunaga, for this additional reason.

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The Patent Office has rejected claim 12 as obvious in view of combination of US 2002/0062547 (Chiodo et al), US 6,876,543 (Mockridge et al), U.S. Published Patent Application No. 2004/0074069 (Browne et al), and further in view of JP 11039053 (Matsunaga).

Claim 12 is allowable over Chiodo, in view of Mockridge and further in view of Matsunaga for the reasoning provided above.

The Patent Office is respectfully requested to reconsider and remove the rejections of the claims 1, 3-5, 7-22, and 24-27 under 35 U.S.C. 103(a) based on Chiodo in view of Mockridge and Browne, with or without Staniszewski and/or Matsunaga, and to allow all of the pending claims 1, 3-5, 7-22, and 24-27 as now presented for examination. An early notification of the allowability of claims 1, 3-5, 7-22, and 24-27 is earnestly solicited.

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Respectfully submitted:



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